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LOCAL GOVERNMENT FINANCE: A SUPPLY-SIDE PERSPECTIVE

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LETTER OF TRANSMITTAL

AUGUST 6, 1984.

To the Members of the Joint Economic Committee:

I am pleased to transmit a study entitled "Local Government Finance: A Supply-Side Perspective," by Professor Ronald Grieson of the University of California, Santa Cruz.

Professor Grieson's study clearly demonstrates an important "supply-side" principle: Namely, that tax rates can be so high as to actually reduce the government's revenue. If this is true, then the converse must also be true: That tax rate reductions can increase revenue above what would have been taken in by the higher rates.

The principle is applied to local government, where it is less likely to be confused with certain macroeconomic factors which make it more difficult to see at the national level. Professor Grieson examines New York City and Philadelphia in particular. It concludes, in each case, that taxes have frequently been so high as to reduce revenues.

I recommend this study for your examination.

Sincerely,

ROGER W. JEPSEN,
Chairman, Joint Economic Committee.

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LOCAL GOVERNMENT FINANCE: A SUPPLY-SIDE PERSPECTIVE

By Ronald Grieson*

Introduction

Let us begin by defining the types of tax possibilities that we are able to investigate. A city could possibly set tax rates at levels lower or higher than necessary to raise sufficient tax revenues in order to finance various public services and investments, whose marginal benefits exceeded marginal costs, and thereby fail to attain the city's potential levels of employment, per capita incomes, or general welfare. Demonstrating such a proposition would require rather complex general equilibrium calculations of the optimal levels expenditures, borrowing, redistribution, taxation, etc. These calculations could not be performed without the extensive estimation of parameters, specification of theory, and a social utility function.[1] Such a project's scope has been beyond that of this or any other research endeavors to date.

We can, however, examine conditions under which a city can increase revenues by increasing a specific tax. Furthermore, we are able to ask when raising a tax rate would be undesirable and, similarly, when it might be desirable *to decrease a tax rate in order to increase revenues.* Why can we answer these questions more easily? There are two reasons: The first reason is that recent empirical studies [2] have shown that it is possible to obtain significant measures of the effects of local taxes. Second, there are ranges in which a tax rate is unambiguously high, almost totally without reference to how pressing revenue needs may be.

Are Such Counter-Productively High Tax Rates Possible?

Empirical estimates yield evidence of the possibility and the existence of counter-productively high tax rates. Undoubtedly, one will want rigorous theoretical and empirical evidence of this occurrence. However, it might first be useful to go over a range of explanations of why so undesirable and, one would speculate, unusual a phenomena might be allowed to occur.

Lack of Information

The simplest and, perhaps, most convincing argument is ignorance. A city may simply not know that a tax is or will be counter-

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[1] For an outline of the elements necessary for such a model see Grieson (1976) and Arnott and Grieson (1981).

[2] The two studies that obtained significant estimates of tax effects were Grieson et al. (1977) and Grieson (1980). Due (1961) reviewed various studies of the effects of taxes.

productive. Cities rarely, if ever, do any economic, econometric, or other studies to determine the effects of taxes, or changes thereof. Furthermore, the effects of changes in tax rates may be distributed over time (lagged), therefore, difficult for them to measure or interpret. They may similarly attribute the loss in tax revenues to an exogenous decline in the base, not realizing the causality.

As we shall see below, local tax effects are, at best, very difficult to disentangle and measure. We were only able to do so because of fortuitous circumstances: the unusual way the tax varied in one study, and the prior knowledge so gained that permitted us to do the other study.

A Narrow (Partial Equilibrium) Focus

In addition, it may be that the tax itself is not counter-productive in a partial equilibrium framework, but is in an aggregate, or more general equilibrium, framework. The tax induced shrinkage of a sector or activity also reduces revenues from other taxes levied upon the same or correlated tax bases in the particular or complimentary sectors. In the same vein, cities may also choose which taxes to increase by means of simple short-run partial equilibrium, equity, political, or ideological bases rather than efficiency or broadly defined social welfare conditions.

The Need for a Nominally Balanced Budget

Local governments may also need to forecast a tax revenue increase in order to present a nominally balanced budget or meet other legal or administrative requirements. During New York City's fiscal crisis, the Federal Government withheld loan guarantees until the city reduced its forecast deficit by $200 million. In that instance, the city increased several of the least desirable or efficient taxes. Our empirical estimates indicate that increasing at least one of the taxes in the package was clearly counter-productive.

The fact that a forecast of a nominal tax revenue increase was accepted when in fact its parts would either be repealed, or be counterproductive and reduce revenue, is not surprising. All levels of government known to the author, from Federal on down, in doing their analysis and projections, presume that taxes have absolutely no allocative effects (they assume that a 10 percent increase in tax rates increases tax revenues 10 percent). This is the extreme minimum bound assumption, for it is highly likely that activities (demand or supply) are effected by changes in prices or taxes. The argument that *when and if estimates are available they are not devoid of measurement error* does not justify a one-sided assumption which can only mislead policymakers.

Perversity in Political Decisionmaking

These inefficient and counter-productive tax rates may occur for the most tax sensitive or responsive (elastic) goods and factor that yield the least surplus (or rent). These activities are quite sensitive to taxes because of the easy availability of substitutes for them and are therefore rather indifferent to the location. Given the low

levels of economic surplus or rent, or the locational indifference of these activities, it is not surprising that they would have little incentive to organize, donate, or politic. The latter is especially true when an industry consists of many small competitive firms. The factors of production that are immobile (inelastic) with respect to taxes will have much greater incentive and resources to be politically active or generous, especially if concentrated or organized. Thus political pressure, control, *et cetera* may be perverse to economic efficiency. It is not truly in the interest of the "rent collecting" activities to counter-productively tax the competitive (elastic) activities, though governments may do so due to lack of information, limited partial equilibrium analyses, short-sightedness, or the political process.

Short-Time Horizons

Let us now turn to the discounting or time preference issue. We have already discussed the kinds of fiscal exigencies and parochial maximations that *might* lead to high internal rates of discount. There may be other less honorable or more short-sighted causes. The simplest is that the budget may need to be, or appear to be, balanced in the immediate future. Time is short, and a counter-productive tax may be the most "politically optimal."Another explanation examines the motivation of elected officials at an admittedly surface level. As a politician's term in office ends and his career rides on reelection, his discount may become extremely high. These pressures, when combined with a desire to use "politically efficient" taxes, can certainly lead to the use of economically and socially inefficient, if not outright counter-productive, taxes.

Optimal Taxation: Theory and Policy

The optimal level of taxation of a particular good or factor, given certain technical conditions,[3] is determined by—

(1) the elasticity of demand (or supply) for the particular good (factor);

(2) the social marginal utilities of private versus government income; and

(3) the levels of non-resident demands or supplies.

The mathematical formulation of these parameters indicates that it would *never* be optimal to set a level of taxation at or above the monopoly level (that level which raises the maximum revenue). This, of course, assumes that the tax is not being used to combat a negative externality: pollution, congestion, etc.

The case when a tax rate approaching the monoply point might be justified occurs when a good is consumed (or supplied) totally by non-residents whose income, employment, and general welfare are of absolutely no concern to the city (locality) in question.

One should in no case tax at a rate above the long-run monopoly or revenue-maximizing rate. Hence, if we find a tax that is above the revenue maximizing rate, it is unquestionably excessive no

[3] Again see Arnott and Grieson (1981) for a study of optimal state and local taxes that introduces the demand for (supply of) goods (factors) by non-residents. The optimal taxation studies include: Diamond and Mirrlees (1971) and Dasgupta (1971). All of these studies assume separable demand or utility for tax goods.

matter how narrowly a city's goals are defined. Raising a tax above the monopoly rate means the city loses tax revenue in addition to employment, sales, consumption, profit, value added, and social welfare. The decline in the tax base is more than proportionate to the rise in the tax rate.

The Simple Essence of and Examples of the Analysis

Optimal taxation indicates that tax levels be set inversely proportional to the sensitivity of the base thereto. One taxes least those things that are more sensitive to taxation and only to the extent it is optimal to do so. An activity that is highly sensitive (elastic) will easily leave or be curtailed as it creates little surplus or rent [4] at the location. Footloose activities need to be taxed lightly.

A relatively inelastic or insensitive factor is one which has a relatively low value or yields relatively little utility, if any, if consumed or employed in another community. It may be a unique or immobile factor, such as land or other natural resources, or a relatively immobile one as fixed capital. The factor could be labor, perhaps civil servants or union members whose wage is above equilibrium and whose membership or employment cannot be transferred to other locals. In New York City, certain activities such as finance, law, advertising, corporate administration, etc., might be locationally inelastic given the somewhat unusual economies of scale present there. On the other hand, most manufacturing may be relatively tax elastic (indifferent) to location at a specific location—particular cities may contain little or no advantage for them.

Though inelastic (rent or surplus collecting) factors may control a political process, it would never be in their self-interest to tax the mobile factors at rates above the revenue maximizing rate even when they (inelastic factors) themselves may be paying higher rates.

Lags and Discount Rates

The fact that the losses of the tax base, employment, etc., that result from a tax increase occur with a lag may well lead cities, which for political or economic reasons, face high discount rates, to levy taxes that are counter-productive in the longer run. This occurs because localities discount losses in social welfare, employment, investment, and aggregate revenues, which occur with a lag subsequent to the tax increase, but of course, do not discount any immediate revenue gains which may accrue. If a city's discount rate or the aforementioned lags are fairly large, it may find it optimal to set its tax rate above the long-run socially optimal rate (the long-run revenue maximizing rate). In fact, during default or other rate circumstances, there may be virtually no interest rate at which an entity can borrow as was the case with New York City. An incumbent politician on the eve of a re-election bid may be willing to accept immense future costs for a city for a small pre-election gain.

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[4] For a full analysis of land values, rents, surpluses, elastics of supply, taxes and their interrelationships, see Grieson (1974).

Empirical Parameters

Our parameters result from studies [5] of New York City's business income tax and Philadelphia's income (personal and business) tax. Both cities' tax rates are relatively high compared to those of their respective States and are above those of any other city.

The New York study occurred first and provided some *a priori* information for the Philadelphia study. Early in the Lindsay administration, New York switched from a tax on gross business margins [6] to a tax on business income or profits.[7] A major alteration in tax base of this sort is quite unusual and provides us with a valuable and unusually infrequent data set. Instead of merely instituting an across-the-board equiproportionate tax increase, which would have given highly collinear cross-section data, the base change results in a "random" alteration in tax rates relative to either the *ex post, ex ante,* or other bases. Rates decreased in several industries. Hence, we were able to do a series of cross-section estimates for several consecutive years to obtain measures of the length and pattern of the intermediate term lag structure.

It is interesting to note that the change in New York's business tax structure followed a study that asserted it to be optimal to have taxes that are an equal percentage of profits (income). The assertion was mistaken in two ways. First, deducting depreciation from the base of the existing gross receipts tax would have yielded a value-added tax, which is usually cited as preferable to business profits or income tax using investment and neutrality criteria. Even more important, as is well known, unless all goods can be and are taxed—as is never the case—Hicksian equal rate taxation is not optimal, whatever the base.

Our overall estimation procedure consisted of first using time series estimates of what employment in each individual industry would have been in the absence of the tax "reform" and then comparing these estimates to actual levels of employment. Thus, it was possible to obtain the changes in output as a result of the alteration to tax rates (as a percentage of profits). The time series projections were adjusted for business cycles and secular trends, as well as changes in demands and costs and technologies by deflating (or normalizing) our employment variable by national employment in each sector.[8] This process was repeated for several years after the 1966–67 tax revision using manufacturing and non-manufacturing sectors as two separate cross-section samples.

Location theory predicts manufacturing to be more indifferent than non-manufacturing to New York City, as there are little or no particularly unique factors or economies of scale or agglomeration to hold manufacturing industry.

As location theory predicts, we found little or no significant tax effects in the non-manufacturing sector.[9]

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[5] See Grieson et al. (1977) and Grieson (1980).

[6] Both tax regimes represented slightly though insignificantly hybrid rather than pure concepts.

[7] This was done at the recommendation of a temporary commission on city finance, see Netzer (1966).

[8] The expected *heteroscedasticity* was discovered and adjusted for.

[9] This could possibly be due to the fact that non-manufacturing sector is too heterogenous to obtain a significant effect. Nonetheless, every indication is that it would be small if it could be estimated accurately.

The estimated "own" tax and aggregate tax revenue elasticities for New York City's manufacturing industry were as follows:

TABLE 1.—NEW YORK CITY—MANUFACTURING SECTOR

[Employment and Revenue Elasticities [1]]

Year	Elasticities	
	Employment	Revenue
1968	[2] −.18	+.82
1969	[3] −.26	+.74
1970	[3] −.31	+.69
1971	[3] −.35	+.65

[1] With 15 degrees of freedom, [2] and [3] indicate the .95 and .995 levels of significance, respectively.

Hence, a short to intermediate lag of 4 or 5 years or somewhat longer is indicated for the reaction to the 1967 tax change analyzed. Unfortunately, 1972 marked changes in New York State and City business and personal income taxes, which may have altered the economy's underlying structure, invalidating further annual estimates.

In order to construct measures of the important aggregate revenue elasticity, $E/_{AR}=(1-ME)$, we need estimates of the ratio, M, where M is the ratio of all tax revenues whose bases would be proportionate to, or highly correlated with, the tax under study to the revenue from the tax under study. We can postulate the taxes whose bases would reasonably be causally connected (highly correlated) and use the subset of them for which data is available to obtain a lower bound estimate of M. For 1969, total New York City's property, commercial occupancy, sales, and business tax revenues derived from manufacturing were 2.9 times the business tax revenue alone. This ratio would be much larger if New York State business tax, State and city personal income and sales tax, and the other State and city tax revenues affected by manufacturing output and employment (that may be lost as a result of relocation out of the city or State) were included. Using three (3) as a reasonably conservative measure of M yields:

TABLE 2. *New York City—Manufacturing sector*

[Aggregate revenue elasticities (M=3)]

Year:	*Elasticities*
1968	+.46
1969	+.28
1970	+.07
1971	−.05

It would thus appear that the tax is likely to be counterproductive with regard to aggregate revenue within a period [10] as short as 3 or 4 years. The 1966–67 change to profits tax perversely shifted more of the business income tax burden to manufacturing from non-manufacturing in addition to increasing the overall effective

[10] In private communications George Stigler indicated that he believes *a priori* that these estimated elasticities are an order of magnitude too low, though much larger ones would yield a rather unstable world. He suggests the rather implausible hypothesis that tax rate changes in the range of 5 or 6 percent could alter the short-run capital labor ratio significantly in one city. We tested the hypothesis and found it not to hold at any level of significance.

tax rate. The tax rate was again increased in 1972 to 6.7 percent and in 1975–76 to 10.05 percent—an approximate doubling in 10 years.

As a tax is increased, the elasticity of demand for the location will increase.[11] Thus, the above-calculated elasticities would most probably have increased in 1972 and 1976, so that increases in the tax rate were probably counter-productive in 1972 and thereafter. Looking solely at the business income tax revenue effect of a change in the tax, one could be misled as to the counter-productivity of the tax as could one be who looked at aggregate tax revenue after too short a time period.

An industry which exhibits a higher locational tax elasticity will not only be more indifferent to the location and earn less rent or surplus per unit of value added, but may also be more competitive and atomistic. The industry would thereby also have less motivation and resource to devote to research, public relations, and political activity with which to explain its case and avoid taxation. These political activities are thus public goods to which the famous "free rider" phenomenon applies. Furthermore, the city's manufacturing industries are inexperienced at and lack the skills, time, trade association, etc., necessary for these pursuits. Because manufacturing industries derive less surplus from location in the city today, they have less incentive to do these things. This is especially true when we compare them with certain non-manufacturing sectors: finance, banking, insurance, brokerage, law, corporate administration, etc.

The Philadelphia Income Tax

Optimal tax analyses apply to income taxes and can be used to indicate the optimal income tax levels both in aggregate and by source of income, given appropriate utility function parameters.

It is difficult, however, using time series data to estimate the relevant empirical parameters.[12] One may not obtain any worthwhile results. There are two factors that made it possible to obtain significant estimates: the lag structure estimated in the New York study could be specified *a priori* in a time series model, and the previous study indicated that normalizing local employment[13] by comparable national employment data eliminates the effects of many short- and long-run secular, cyclical, productivity, and demand variations. Making use of the above, and a time variable for local trends, parameter estimates for each of Philadelphia's major employment sectors were constructed.

This very simple model *necessitated by the limited degree of freedom and data* does demonstrate that so simple a model may be used to determine the order of magnitude tax parameters fairly well. All of the usual statistical and econometric possibilities and problems, of course, remain. For example, if similar (competitive) localities raise their taxes at similar times the magnitude of our tax parameters would be underestimated.

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[11] This is derivable from the usual straight line, or almost any demand curve, subject to a budget constraint.

[12] See Grieson 1980.

[13] Used as a measure of output or value added.

It may be argued that the Philadelphia income tax was raised in response to downward shocks in employment not shared by the Nation. Its business cycle may last longer or be deeper, for instance. Our use of an *a priori* lagged tax variable would significantly mitigate any such effects. Alternatively, lags in information about tax revenues, political decisions, and their implementation would bias our estimates in the opposite direction—downward. Data were only available through 1975, the trough of a recession, before the tax increase occurred. In total, it is not possible to calculate in advance what direction any bias might be in. Again, Philadelphia employment was normalized by contemporaneous United States employment by sector.

As in the case of New York City's "business income" tax, Philadelphia's "income" tax was and is still the highest of any city. The Philadelphia income tax increased from 3 5/16 percent to 4 5/16 percent in 1976. It is a flat-rate tax that applies to all income (including corporate) generated within or accuring to residents of the city. It yields 40 to 50 percent of the city's revenue. The property tax constitutes most of the remainder of the city's revenues.

The tax parameter estimates [14] which follow in Table 3 are for the tax-elasticities that would apply to the average value of the data up to the 3 5/16 percent rate of 1975, but not including the 4 5/16 percent rate of 1976.

TABLE 3.—TAX ELASTICITIES ESTIMATED FOR THE PHILADELPHIA INCOME TAX [1]

[Normalized by U.S. employment]

Sector	Employment (E)	Revenue (1–E)	Aggregate business (1–ME)
Manufacturing and service	[2] −0.30	0.70	0.40
Contract construction	[2] −2.14	−1.14	−3.28
Wholesale and retail trade	[2] 1.62	.38	−.24
Finance insurance and real estate	−.31	.69	.38
Total (weighted by employment)	−.47	.53	.06

[1] M=2 appears a reasonable estimate of aggregate correlated tax bases, given that the income tax constituted about 40 percent of revenue over the same period.
[2] Indicates significance at the 0.99 level using a one tail test.

These findings indicate that the Philadelphia income tax may well have been near the counter-productive, revenue maximizing point at a 3 5/16 percent rate. The 4 5/16 percent rate that followed seems likely to have *pushed the tax rate into the counter-productive range and above the revenue maximizing range.* There has been substantial resistance to raising the property tax in Philadelphia since its impact is perceived to be relatively greater for residents.

The combined manufacturing and services sector's simple elasticity was −.30, while manufacturing and services individually have elasticities of −.36 and −.30, respectively. Both elasticities are remarkably similar to the −.35 estimated for New York City's manufacturing section. Philadelphia appears not to share New York City's unique attractions for non-manufacturing.

[14] Aggregation is done to the level at which relatively homogenous behavior would persist, thus optimizing the efficiency of our estimators.

The Regional Argument

It is possible, although improbable, that the Philadelphia results might be due in part to some highly coincidental increases in Philadelphia's state taxes or a highly coincidental general decline in the economies of Pennsylvania or the Mid-Atlantic/Northeast region. To test this hypothesis, Philadelphia's employment was sectorally normalized by Pennsylvania's (including and excluding Philadelphia itself). The use of Pennsylvania, as opposed to national, data does reduce the sample size and thus goodness of fit measures [15] as will be observed below. More significantly, in our estimated State tax parameters, the bias will be proportionate to Philadelphia's share of employment. In order to account for this bias, I also normalized Philadelphia employment by non-Philadelphia State employment and obtained higher estimates, as one would predict. This will introduce a townward bias. Since the results were as expected and never significantly different from those in Table 3 (U.S.) or Table 4 (all Pennsylvania), they were omitted in the interest of brevity.

TABLE 4.—TAX ELASTICITIES USING PENNSYLVANIA (TOTAL) EMPLOYMENT

Sector	Employment	Revenue	Aggregate revenue
Aggregate manufacturing and services	[1] −0.23	+0.77	+0.54
Contract construction	[1] −1.02	−.02	+1.05
Wholesale and retail	−.56	+.60	+.20
Total	−.38	+.62	+.24

[1] Indicates a significance at the 0.95 level using a one-tail test.

No pairwise combination of any of the three estimates of each of the 19 parameters estimated was significantly different at the 90 percent or higher level.[16] The Pennsylvania data produced less significant and perhaps efficient, but not significantly different, estimates. All of the estimated elasticities were also quite similar in absolute magnitude. Using all Pennsylvania data yielded estimates that were 17 to 20 percent lower than with U.S. data. This is as anticipated in that the inclusion of Philadelphia, which is 17 percent of State employment, in the Pennsylvania data would be expected to lower (bias downward) coefficients about that much.

Thus, the decline in Philadelphia employment is not a State or regional problem, but a local one due in large measure to their income tax policies. New York City has a similar problem which is also significant due in part to some of their tax policies.

[15] Auto correlation was not a problem in any of the estimation procedures employed.
[16] This section draws heavily on Grieson (1980).

REFERENCES

1. R. J. Arnott and R. E. Grieson, "Optimal Fiscal Policy for a State and Local Government," *Journal of Urban Economics*, 9, 23–48, January 1981.

2. A. B. Atkinson and N. H. Stern, "Pigou, Taxation and Public Goods," *Review of Economic Studies*, 41, 119–123, 1974.

3. A. B. Atkinson and J.E. Stiglitz, "The Design of Tax Structure: Direct vs. Indirect Taxation," *Journal of Public Economics*, 6, 5–75, 1976.

4. M. Boiteux, "Sur la Gestion des Monopoles Publics Astreints a 'l Equilibrium Budgetaire," *Econometrica*, 24, 22–40, 1956.

5. P. A. Diamond and J. A. Mirrlees, "Optimal Taxation and Public Production," *American Economics Review*," 61, 8–27, 261–278 (1971).

6. J. Due, "Studies of State and Local Tax Influences on the Location of Industry," *National Tax Journal*, 19, 163–173 (1961).

7. R. E. Grieson, "The Economics of Property Taxes and Land Values: The Elasticity of Supply of Structures," *Journal of Urban Economics*, 1, 367–381, 1974.

8. R. E. Grieson, "On the Optimal Level of Taxation, Borrowing, and Government Expenditures," *National Tax Journal*, 8, 251–254 (1974).

9. R. E. Grieson,"the Welfare Implications of Various Pricing Schemes in Monopolistic Competition Due to Location," in *Public and Urban Economics*, R. E. Grieson, Ed., Chapter 15, 235–246, Lexington Books, Mass. (1976).

10. R. E. Grieson *et al.*, "The Effects of Business Taxation on the Location of Industry," *Journal of Urban Economics*, 4, 170–185 (1977).

11. R. E. Grieson, "Theoretical and Empirical Analysis of the Effects of the Philadelphia Income Tax," *Journal of Urban Economics*, 8, 123–137, July 1980.

12. A. Harberger, "Three Basic Postulates in Applied Welfare Economics," *Journal of Economic Literature* (1971).

13. A. P. Lerner, "On Optimal Taxes with an Untaxable Sector," *American Economic Review*, 60, 284–294.

14. L. N. Moses, "A General Equilibrium Model of Production, Interregional Trade and Location of Industry," *Review of Economics and Statistics*, 42 (1960).

15. D. Netzer *et al.*, "Financing Government in New York City: Final Research Report of the Graduate School of Public Administration, New York University, to the Temporary Commission on City Finances, City of New York," New York (1966).

16. A. C. Pigou, *A Study of Public Finances*, New York: MacMillan, 1947.

17. F. P. Ramsey, "A Contribution to the Theory of Taxation," *Economic Journal*, 37, 47–61 (1927).

18. J. E. Stiglitz and P. Dasgupta, "Differential Taxation, Public Goods and Economic Efficiency," *Review of Economic Studies*, 38, 154–174 (1971).

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